

REMARKS

The present amendment is in response to the Office Action dated August 9, 2004, where the Examiner rejected all claims 1-26 on the grounds of a 35 USC 103 obviousness type rejection.

Additionally, the Detailed Action identified informalities to the Specification, and a claim rejection to claims 6.

By the present amendment, the informalities in the Specification and the Claim Objections identified in the Detailed Action are addressed. Additionally, the Applicant responds to the grounds for claim rejection in claims 1-26.

A. Specification

The Examiner identified the informalities on page 2, line 8 of the Specification and requested correction of the appropriate serial number of the referenced patent application. The identified corrections have been made as indicated in the Amendments above.

B. Claim Rejections

The Examiner has rejected claims 6-13 under 35 USC 112, second paragraph, as being indefinite. In particular, the Examiner identifies the limitation “said second hardmask layer” for claims 6. As per the Examiner’s suggestion, the Applicant has been amended to refer to “said intermediate layer.”

C. Claim Rejections – 35 USC § 103

The Examiner has rejected claims 1 to 26 as being unpatentable over Wu et al., U.S. Patent No. 6,720,256 (hereinafter “Wu ‘256”) in view of Levy, U.S. Patent No. 5,126,231 (hereinafter “Levy ‘231”) and Hsue et al., U.S. Patent 6,696,222 (hereinafter “Hsue ‘222”). The Applicant respectfully disagrees with this rejection and provides arguments to overcome this rejection below.

Firstly, the Examiner has described the relevant teachings which apply to obviousness rejection for the following claims: 2-3, 5-7, 9-13, 15-16, 18, and 19. The Examiner has not described with particularity the relevant teaching that apply to the obviousness rejection for claims: 1, 4, 8, 14, 17, 20-26.

As stated in section 706.02(j) of the MPEP:

After indicating that the rejection is under the 35 U.S.C. 103, the examiner should set forth in the Office Action:

- (A) the relevant teachings of the prior art relied upon, preferably with reference to the relevant column or page number(s) and line number(s) where appropriate,
- (B) the difference or differences in the claim over the applied reference(s),
- (C) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter, and
- (D) the explanation why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification.

The Applicant respectfully submits that the Examiner’s obviousness rejection for the claims 1,4, 8, 14, 17, 20-26 are not clearly addressed in the Examiner’s Office Action because the Examiner has not identified: the relevant teaching of the prior art that were relied to make the obviousness rejection for these claims; the differences in these claims over the applied references has not been described; the proposed modification of the applied reference necessary to arrive at the claimed subject matter has also not been

described; and motivations to make the proposed modification have not been clearly described for each of the claims identified.

The Applicant respectfully requests clarification so that the Applicant can be given a fair opportunity to reply to the rejection, and also so that a clear written record can be created as the basis for granting a patent.

However, to expedite the prosecution of this patent application, the Applicant shall make a good faith attempt to provide responsive communications for the Examiner's claim rejections.

The Applicant must clarify some confusion about the comment made by the Examiner on Page 3, line 6 of the Office Action. The Examiner appears to apply the reference number 74 in Wu '256 for the "forming an OSG layer (74, called a polyimide)." For clarification purposes a polyimide is NOT an OSG compound. As is well-known to those of ordinary skill in the art of organic chemistry, a polyimide is an organic polymer that has an "imide" group. An imide group consists of a Nitrogen molecule sandwiched between two carbonyl groups. In general terms, a polyimide is an organic compound that has a nitrogen component. OSG is short for organosilicate glass and includes Si-C and Si-O bonds. Clearly, it appears that the Examiner has made a mistake.

Upon closer review of Wu '256 at col: 9, line 57-62, it appears that the reference number 74 describes a dielectric layer that includes a "carbon doped SiO₂." The Applicant shall assume that the Examiner intended the carbon doped SiO₂ to refer to the OSG compound described in the Applicant's claim.

Regarding claim 1, it appears that the Examiner is communicating that Wu '256 teaches an IC structure having a photoresist materials and an organosilicate material. It

appears that the organosilicate material is taught at reference number 74 of Wu '256, and the photoresist material is taught at col. 9, lines 65-67m col. 10, lines 1-2. It appears that Wu '256 is NOT cited for purposes of "stripping the photoresist."

The Examiner appears to conclude that for claim 1, Wu '256 does NOT teach stripping the photoresist layer by using plasma nitrous oxide. The Examiner appears to communicate that Levy '231:

... teaches a method of stripping an integrated circuit (IC) having a photoresist material and an organosilicate glass (OSG) material comprising:

Feeding a nitrous oxide (N₂O) gas into the reactor (see col. 5, lines 51-64);

Generating a plasma in the reactor (see col. 5, lines 51-64);

Stripping the photoresist (30) by using the nitrous oxide gas (see col. 5, lines 51-64). See page 4, lines 13-17 of the Office Action.

Upon closer inspection of the Examiner's communication, the Applicant would like to bring to the Examiner's attention that col. 5, lines 51-64, only teaches feeding nitrous oxide to remove a photoresist layer.

The Examiner also states that "the nitrous oxide gas have to feed in to the plasma reactor to ionize before etching process begin." It appears that the Examiner is saying that the nitrous oxide gas is used for etching the OSG. However, Applicant respectfully submits that the Examiner intended to indicate that the nitrous oxide gas was being used to strip/remove the photoresist layer. The Applicant brings this distinction to the attention of the Examiner, so that there may be consistency between the terms used in the patent application and those used during the prosecution of this patent application. The Applicant has attempted to use the term "stripping" to refer to removal of the photoresist. The term "etching" is used to refer to the removal of the OSG material during the dual damascene processes of via and trench etching.

Returning to the Levy '231 prior art reference, the Applicant respectfully submits that Levy '231 does not teach an OSG dielectric compound. The Applicant has conducted a review of Levy '231, and concludes that Levy '231 does NOT teach or disclose any reference to an organosilicate glass (OSG) compound. The, the Levy '231 patent does teach the use of nitrous oxide (N₂O) for removing the photoresist layer, but there is no teaching that includes the additional limitation of an IC structure that comprises an OSG material.

With respect to claim 1, it does not appear that the Hsue '222 reference is applicable. If further clarification is deemed necessary by the Examiner, the Applicant would be grateful for such assistance.

As stated in Section 2143 of the MPEP:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the reference themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. Section 2143, MPEP Rev. 2.0, May 2004, pg. 2100-129.

For independent claim 1, the Applicant contends that the Examiner has not been able to establish a *prima facie* case of obviousness. Most notably, the prior art references cited by the Examiner have failed to teach or suggest all the claim limitations of claim 1. As interpreted by the Applicant, Wu '256 teaches an IC structure having a photoresist materials and an organosilicate material. Levy '231 teaches feeding a nitrous oxide (N₂O) gas and stripping the photoresist. However, neither Wu '256 or Levy '231 teach the additional limitation of "generating a high

selectivity between the photoresist layer and the OSG layer.” Support for this high selectivity is provided *inter alia* on Page 14 -16 of the Applicant’s patent application.

Additionally, there is no suggestion or motivation in either Wu ‘256 or Levy ‘231 for using nitrous oxide (N₂O) gas to strip the photoresist of an IC structure having an OSG layer. Furthermore, there is no teaching of a reasonable expectation of success in either Wu ‘256 or Levy ‘231 for using nitrous oxide (N₂O) gas to strip the photoresist of an IC structure having an OSG layer

Further still, the Applicant teaches the substantial superiority of using nitrous oxide for photoresist removal of IC structure having an exposed OSG layer. At Page 4 of the Applicant’s patent application, the Applicant has identified particular problems associated with removing a photoresist layer using well-known commercial gases and/or gas mixtures. And at Table 2 of the Applicant’s patent application, the Applicant compares various gases to nitrous oxide (N₂O), and shows the substantial superiority of nitrous oxide. Neither Wu ‘256 or Levy ‘231 identify the problems associated with photoresist removal of an IC structure that has an OSG layer AND the substantial superiority of nitrous oxide over other gases or gas mixtures.

Therefore, the Applicant respectfully submits that for claim 1, the Applicant has overcome the obviousness objection by showing that:

1. Wu ‘256 and Levy ‘231 fail to teach all claim limitations.
2. Wu ‘256 and Levy ‘231 fail to suggest or motivate combining nitrous oxide for removal of a photoresist layer on an IC structure having an OSG layer.

3. Wu '256 and Levy '231 fail to teach a reasonable expectation of success.
4. Wu '256 and Levy '231 fail to identify the problems associated with photoresist removal for an IC structure having an OSG layer.
5. Wu '256 and Levy '231 fail to teach the substantial superiority of using nitrous oxide for photoresist removal for an IC structure having an OSG layer.

Therefore, as it relates to claim 1, the Applicant submits that claim 1 is in a state of allowance.

Regarding amended independent claims 6, the Examiner shall appreciate that the “spirit” of claim 6 is similar to independent claim 1. In fact claim 6 has additional limitations which relate to an additional intermediate layer in the IC structure. It appears that the Examiner has rejected this claim by relying on Wu '256 and Levy '231 in a manner that is consistent with the Examiner’s arguments for claim 1. Since the Examiner’s arguments for claim 6 are substantially similar to the Examiner’s arguments for claim 1, the Applicant herein incorporates by reference the arguments provided above. In view of the arguments made for claim 1, the Applicant contends that sufficient and satisfactory arguments have been provided to overcome the Examiner’s obviousness rejection for claim 1.

Regarding independent claim 14, claim 14 relates to a method for performing a via first etch of an IC structure that includes a photoresist layer and an OSG layer. Upon closer review of the Examiner’s action, there is no specific comment about independent claim 14. Thus, the Applicant is left to assume that only the Wu '256 and Levy '231 references are on point. Again the independent claim 14 relates to using nitrous oxide for photoresist removal with an IC having

an OSG layer. In view of this fundamental similarity between claim 14 and claim 1, the Applicant herein incorporates by reference the arguments that were made above for claim 1. In view of the above, Applicant contends that independent claim 14 is in a state of allowance.

Regarding independent claim 20, claim 20 relates to a method for performing a trench first etch of an IC structure that includes a photoresist layer and an OSG layer. Upon closer review of the Examiner's action, there is no specific comment about independent claim 14. Thus, the Applicant is left to assume that only the Wu '256 and Levy '231 references are on point. The independent claim 20 describes using nitrous oxide for photoresist removal with an IC having an OSG layer. In view of the fundamental similarity between claim 20 and claim 1, the Applicant herein incorporates by reference the arguments that were made above for claim 1. Thus, in view of the compelling arguments made by Applicant for claim 1, the Applicant contends that independent claim 20 is in a state of allowance.

Regarding dependent claims 2-5, each of these claims depend on claim 1 and as such should also be found to be in a state of allowance. The Applicant respectfully reserves the right to argue the merits of these dependent claims at a later time. However, in light of Applicant's confusion about the Examiner's rejections and due to the compelling arguments made for independent claim 1 to overcome the obviousness rejection, the Applicant contends that the need to argue the merits of the dependent claims 2-5 can be accomplished more effectively at a later time, if it becomes necessary.

Regarding dependent claims 7-13, each of these claims depend on claim 6 and as such should also be found to be in a state of allowance. The Applicant respectfully

reserves the right to argue the merits of these dependent claims at a later time. However, in light of Applicant's confusion about the Examiner's rejections and due to the compelling arguments made for independent claim 1 to overcome the obviousness rejection, the Applicant contends that the need to argue the merits of the dependent claims 7-13 can be accomplished more effectively at a later time, if it becomes necessary.

Regarding dependent claims 15-19, each of these claims depend on claim 14 and as such should also be found to be in a state of allowance. The Applicant respectfully reserves the right to argue the merits of these dependent claims at a later time. However, in light of Applicant's confusion about the Examiner's rejections and due to the compelling arguments made for independent claim 1 to overcome the obviousness rejection, the Applicant contends that the need to argue the merits of the dependent claims 15-19 can be accomplished more effectively at a later time, if it becomes necessary.

Regarding dependent claims 21-26, each of these claims depend on claim 20 and as such should also be found to be in a state of allowance. The Applicant respectfully reserves the right to argue the merits of these dependent claims at a later time. However, in light of Applicant's confusion about the Examiner's rejections and due to the compelling arguments made for independent claim 1 to overcome the obviousness rejection, the Applicant contends that the need to argue the merits of the dependent claims 21-26 can be accomplished more effectively at a later time, if it becomes necessary.

D. Conclusion

For all the foregoing reasons, allowance of claims 1-26 pending in the present application is respectfully requested.

Respectfully Submitted;

Dated: 12/9/04


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